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U.S. DEPARTMENT OF AGRICULTURE

the ROLLED-TOWEL SEED TESTER for CORN

Leaflet No. 425

United States Department of Agriculture

the ROLLED-TOWEL SEED TESTER for CORN

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Methods for testing seed corn germination have changed with the development of hybrids. In the days of open-pollinated varieties, individual ears were usually tested. The rag-doll seed tester was well suited for that purpose. With hybrids, the sample to be tested consists of a mixture of seed from many ears, and more kernels in a single test are required. The rolled-towel seed tester is used. It is inexpensive and easy to use and gives reliable results.

This leaflet describes the use of this seed tester for corn in the ordinary, or standard, germination test and how, with certain modifications, it may be used in the cold germination test. The procedures are simple and practical for use either in seed-testing laboratories or on the farm.

In addition to corn, the standard germination test can be used for testing seeds of small grains, cucurbits, peas, soybeans, alfalfa, clovers, and undoubtedly many other crops. The cold germination test is essentially a disease study, since it tests the germination of seed under conditions made favorable for seed rot and seedling diseases.

Standard germination test

EQUIPMENT

For the standard germination test, the equipment includes paper towels, a shallow pan of water for wetting the towels, and proper containers with covers. In extensive testing, as in seed-testing laboratories, a heavy wire screen placed over a sink is used. It provides a drained working surface for rolling the wet towels. If a sink is not available, other devices for draining excess water may be utilized.

Almost any type of paper toweling may be used. The ordinary unbleached washroom towels, 10 by 10½ inches, or the longer germination towels, 10 by 15 inches, used in many laboratories are suitable.

A rustproof container that holds the rolled towels, or "dolls," upright on end is best, because it permits uniform drainage. When the dolls are stacked horizontally, germination in the lower layers often is erratic because of excess moisture and deficient oxygen. A specially made aluminum box, 4½ by 9 and 10 inches deep, with perforations in the bottom for drainage, is most satisfactory where extensive tests are made.

**Figure 1.—Distributing the kernels on
the towels in the standard germina-
tion test.**

PN-200



Figure 2.—Rolling a doll. PN-201

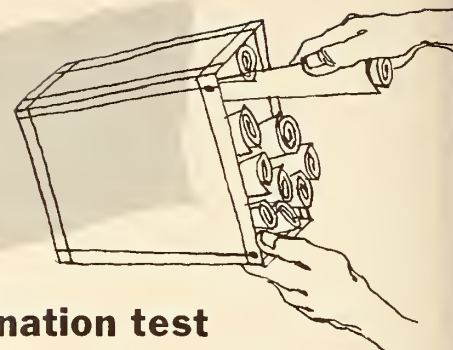


PROCEDURE

Count out three 50-kernel lots of corn for each sample to be tested, and place them in small containers that will stack in piles of three without spilling the seed. Metal tops from jelly glasses are excellent for this purpose. Number each lot on paper with a soft-lead pencil.

Immerse two ordinary paper towels, 10 by 10½ inches, in the shallow pan of water. Lay one towel on top of the other, with the longer dimensions extending away from you. Place the label between the towels in an upper corner. Distribute one lot of 50 kernels evenly on the towels, leaving a margin of about 2 inches (fig. 1). Lay another wet towel over the kernels and roll all three, which comprise the seed tester, into a paper doll (fig. 2). The towels should not be rolled or packed so tightly as to interfere with germination. When the longer towel is used, only one is needed under the kernels. When the doll container (fig. 3) is full, cover the open end with wax paper or a plastic sheet held in place with a rubber band. Keep at room temperature (70° to 75° F.) for 4 or 5 days. Then unroll the dolls and read the germinations.

The germinating seeds and seedlings are grouped into three categories—dead, weak, and strong (fig. 4). Two weeks sometimes are counted as one strong in calculating a germination index, but in other calculations the weaks are counted as dead, or not germinated. The germination index is the sum of the percentages of strong plus one-half of the percentages of weak.



Cold germination test

The cold germination test for seed corn is started in cold soil and completed in warm soil. It does not test resistance of seed to cold itself but to soil molds or fungi, mainly *Pythium* species, which inhabit all soils and are capable of causing seed rot and seedling diseases when untreated kernels are germinating slowly in cold soil.

This disease test can be used for other crops whose seeds are subject to seed rot diseases. Good results have been obtained with cotton at temperatures similar to those described for the corn tests (see below). With peas—which rot more readily in warmer soils—excellent results have been obtained in tests conducted at 60° to 70° F. The best temperatures for an untried crop can be learned only from adequate experiments.

EQUIPMENT

A supply of soil and an ordinary electric refrigerator that can be maintained at 45° to 50° F. are needed for cold-testing seed corn, in addition to the equipment used

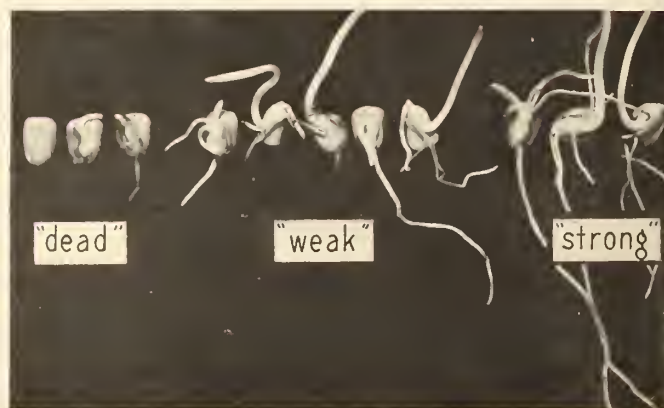
Figure 3.—Placing a doll in the container.

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Figure 4.—Three germination classes, showing the range within each.

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for the standard germination test. Although almost any type of field soil can be used, muck soil is preferable, because it specially favors disease development and is of suitable texture for the rolled-towel seed tester. The large and expensive refrigeration equipment and extensive warm-room space used in the older methods of cold testing are no longer needed.

PROCEDURE

Keep the soil in a covered container to prevent rapid drying and add water if it becomes dry. If the soil is allowed to dry out, *Pythium* loses its virulence and the test for disease resistance is less severe. Follow the same procedure as for the standard germination test with these modifications. Spread evenly a layer of soil, one-eighth inch deep, on the wet towels, and then place one lot of 50 corn kernels on the soil. As in the standard test, cover with another wet towel, roll the towels into a doll, place it in the container, and cover the container when it is full.

Instead of keeping the container of dolls at room temperature, place it in a refrigerator maintained at 45° to 50° F. If the temperature exceeds 50°, the cold-test differentials for disease resistance will be lost, and temperatures lower than 45° retard the action of the soil molds and a longer incubation is necessary.

A 10-day period in the refrigerator is about right for most tests. When testing different chemicals for their efficiency as seed-treatment materials, the incubation period may be extended to 15 days. Six to eight days at 45° to 50° usually is sufficient when comparing corn inbred lines for differences in resistance to seed-rotting molds.

When the period of incubation has been completed, move the container of dolls to a warm room (70° to 75°) and read the germinations 3 days later (fig. 5). As in the standard germination test, group the germinating seeds and seedlings into the three categories of dead, weak, and strong, and then calculate the germination index.

Figure 5.—Poor and good germination results with the rolled-towel seed tester in the cold germination test.

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This leaflet supersedes Farmers' Bulletin 948, The Rag-Doll Seed Tester, Its Use in Determining What Ears of Corn Are Fit for Seed.

PN-205

Cover illustration.—Germinations ready for reading.

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